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COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods
(Fifteenth session,
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agenda item 5(g))

MISCELLANEOUS DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Toxic by inhalation substances
Packaging requirements

Transmitted by the Expert from the United States of America

Introduction

1. In document ST/SG/AC.10/C.3/1997/20 (USA) submitted to the thirteenth session of the Sub-Committee possible packing instructions for TIH substances of Group IA (substances with an inhalation toxicity of 250 ml/m^3 or less and $V \geq 500LC_{50}$) and IB (substances with an inhalation toxicity of less than or equal to 1000 ml/m^3 and $V \geq 10LC_{50}$) were identified. Some comments were received and the expert from the United States agreed to consider them in the development of further packaging proposals for TIH substances. The purpose of this paper is to propose TIH packaging instructions.

2. As noted in ST/SG/AC.10/C.3/1997/20 in addition to US regulations, other regulatory systems such as IMO and ADR/RID also include packaging provisions for selected TIH substances. In all likelihood, similar to the experience in the United States, these requirements were adopted on the basis of industry proposals when there was a need to transport these particular substances. The types of packagings authorized can be characterized as including:

- steel cylinders,
- special combination packagings with specifically prescribed inner packaging and requirements for cushioning material, and
- special metal drums with in some cases able to withstand high test pressures (5 to 10 bar).

3. The expert from the United States in response to comments received at the thirteenth session considered proposing packaging provisions which were strictly performance oriented. In particular a puncture test simulating a fork lift tine striking the packaging was experimented with. The test showed significantly better puncture resistance in the case of existing packagings authorized for use for TIH substances under US regulations. However, under the time constraint of including packaging provisions by December 1998, it does not appear that there is sufficient time to fully develop puncture test criteria for such packagings.

Proposed packing instructions

4. There is some commonality among existing packaging provisions currently applied to TIH substances in various regulations. In all cases, packing instructions prescribed for TIH substances are intended to decrease the risk that substances are released in transportation incidents. While the existing UN performance tests provide an acceptable degree of protection in the case of most dangerous goods, the packagings currently prescribed for TIH substances imply a desire to enhance the survivability of TIH packagings. Furthermore, as the risk of a significant release varies with the size of the packaging, the level of severity of the packaging requirements varies according to the quantity of substance in the packaging.

5. In reviewing the various packagings provisions currently prescribed for TIH substances, the expert from the United States concludes that all substances can be dealt with under two generic packing instructions.

6. The basic philosophy behind the packagings proposed in the packing instructions attached as Annex 1 is to allow the substance to be transported in

- an extremely robust packaging (i.e, a gas cylinder);
- in single packagings overpacked with an additional UN tested packaging, with each packaging qualified to retain the substance;
- in combination packagings that consist of three packagings; and
- for Group IB substances in high integrity single packagings for "exclusive use shipments" (shipments going from a consignor to a single consignee without intermediate transfer) in a freight container or transport unit.

7. The concept of the packagings proposed is not new. Other substances of high danger substances covered by the Model Regulation are already required to be transported in similar packagings (e.g., certain explosives and infectious substances).

8. It is proposed that the packing instruction P004 be adopted for Group IA TIH substances and that packing instruction P005s be adopted for Group IB TIH substances.

P004	PACKING INSTRUCTION	P004

The following packagings are authorized:

(a) Gas cylinders conforming to the construction, testing and filling requirements approved by the competent authority. Each cylinder with a wall thickness less than 3 mm must be overpacked in a strong outer packaging and secured or cushioned so as to prevent significant movement within the outer packaging during normal conditions of transport.

(b) 1A1, 1B1, and 1H1 drums or 6HA1 composite packagings with a capacity not exceeding 220 litres which are overpacked in 1A2 or 1H2 drums are authorized. The overpacked package shall conform to the following requirements:

(1) the package shall be of a design type meeting the requirements prescribed in Chapter 6.1 at the PG I performance level for liquids except that:

(i) the hydrostatic pressure test shall be carried out at a pressure of at least the greater of two times the vapor pressure of the substance to be transported at 55°C or 300 kPa; and

(ii) the design and production leakproofness tests shall be carried out at a test pressure of at least the greater of two times the vapor pressure of the substance to be transported at 55°C or 0.30 bar.

(2) closures shall be of a screw cap type that are :

(i) physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport; and

(ii) provided with a cap seal that is capable of withstanding an internal pressure of at least 100 kPa.

(3) be so packed inside the outer drum overpack using inert absorbent and cushioning material so that no outside surface of the overpacked package is less than 5 cm from any inside surface of the overpacking drum.

The outer drum shall:

(i) conform to the performance test requirements for solids at the Packing Group I performance level; and
(ii) shall withstand a hydrostatic pressure test in accordance with Chapter 6.1 at a pressure of at least 100 kPa.

(c) In combination packagings, consisting of an inner packaging system and one of the following outer packagings:
Drums: 1A2, 1B2, 1D, 1G and 1H2
Jerricans: 3A2, 3H2
Boxes: 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 and 4H2

(1) The inner packaging system shall consist of impact-resistant glass, plastic or metal receptacles cushioned with an inert absorbent material inside a leakproof packaging of metal or plastic. The capacity of each inner receptacle shall not exceed 4 litres. The closure of each inner receptacle shall be physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport. The inner packaging system shall conform to the performance test requirements of Chapter 6.1 at the PG I performance level without the benefit of the outer packaging.
(2) The outer packaging shall also conform to the performance test requirements of Chapter 6.1 at the PG I performance level as a single packaging suitable for solids.
(3) The amount of liquid contained within the outer packaging may not exceed 16 litres.

This packing instruction applies to Group IA (substances with an inhalation toxicity of 250 ml/m³ or less and V ≥ 500LC$_{50}$)

P005 **PACKING INSTRUCTION** **P005**

The following packagings are authorized:
(a) Packagings that are authorized in packing instruction P004.
(b) 1A1, 1B1 and 1H1 drums or 6HA1 composite packagings with a capacity not exceeding 220 litres are authorized as single packagings subject to the following requirements and conditions:

(1) packagings shall be of a design type meeting the requirements prescribed in Chapter 6.1 at the PG I performance level for liquids except that:

(i) the hydrostatic pressure test shall be carried out at a pressure of at least the greater of two times the vapor pressure of the substance to be transported at 55°C or 300 kPa; and

(ii) the design and production leakproofness tests shall be carried out at a test pressure of at least the greater of two times the vapor pressure of the substance to be transported at 55°C or 0.30 bar.

(2) The minimum thickness of each package shall be at least:

PACKAGING TYPE		MINIMUM THICKNESS FOR EACH CAPACITY RANGE		
		CAPACITY <= 30 l	30 l < CAPACITY <= 120 l	120 l < CAPACITY <= 220 l
1A1		0.7 mm	1.1 mm	1.4 mm
1B1		2.8 mm	3.9 mm	4.7 mm
1H1		2.0 mm	3.2 mm	3.2 mm
6HA1	INNER RECEPTACLE	1.6 mm	1.6 mm	1.6 mm
	OUTER RECEPTACLE	0.7 mm	1.0 mm	1.1 mm

(3) closures shall be of a screw cap type that are :

(i) physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport; and

(ii) provided with a cap seal that is capable of withstanding an internal pressure of at least 100 kPa.

(4) packages are transported in a transport unit loaded, blocked, braced and sealed by the consignor;

(5) Packages are not be stacked within the transport unit;

(6) the consignment is from one origin to one destination only without any intermediate pickup or delivery;

This packing instruction applies Group IB (substances with an inhalation toxicity of less than or equal to 1000 ml/m³ and $V \geq 10LC_{50}$ that do not meet Group IA criteria)